Modelling, simulation and analysis of security of supply scenarios in integrated gas and electricity transmission networks

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Propositions belonging to the dissertation

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1. Steady state gas network models are inappropriate for quantifying the impact of disruptions on security gas supply. (this dissertation)

2. To capture the bi-directional interdependence between gas and electricity networks appropriately requires the use of combined simulation models that solve the physical and coupling equations simultaneously. (this dissertation)

3. Analysing coupled gas and electricity networks in an integrated manner helps detect potential threats to security of supply. (this dissertation)

4. Security of supply parameters, such as energy not supplied, percentage of energy not supplied, and survival time are helpful to quantify and compare the impact of disruptions on security of energy supply. (this dissertation)

5. The transition to a low carbon energy system cannot be achieved without natural gas as the main back-up fuel for variable renewable energy sources.

6. The coupling between gas, electricity and heat networks will increase as more variable renewable energy sources are integrated into the electric power system.

7. Power to Gas and Power to Heat are key technologies for meeting the growing demand for flexibility and energy storage in the electric power system.

8. The probability to complete an external PhD thesis is much lower than the probability to complete an internal PhD thesis funded by the university

These propositions are considered opposable and defendable and as such have been approved by the supervisor, Prof. R. Herber.